Further, the Commission's substantial experience with cellular lotteries provides it with an opportunity to avoid past pitfalls which have slowed the process without returning any consumer benefit.[56] For example, the Commission's varied positions on financial qualification showings for cellular applicants led to innumerable opportunities for pleadings on these issues, enriching not consumers but only the participants' lawyers. Concerns over "insincere" or speculative lottery participants also resulted in legalistic controversies which tended only to impede rather than promote service to the public. With PCS lotteries, the Commission has the considerable advantage of designing a lottery system to avoid past errors.

The delays associated with cellular lotteries are more properly attributable to the learning process than the belief that delays are inherent in the lottery process. While the first cellular MSA lottery, at which thirty MSAs were assigned, was conducted nineteen months after the applications were filed, later lotteries were significantly more efficient. In fact, the RSA lotteries typically were conducted within months of the date that applications were filed with the Commission.

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56 Of course, services provided via unlicensed PCS by definition can be made available to the public without the need for a licensing mechanism.

VII. REGULATORY REGIME

The section of the Notice discussing the regulatory status for PCS tentatively concludes that because PCS is likely to be a "highly competitive service,. . . regardless of the regulatory classification. . . PCS should be subject to minimal regulation." Notice at 5712. The Notice seeks comment on whether PCS should be classified as a common or a private carrier service. It also requests comments to address Sections 3(gg) and 332(c) of the Communications Act, which define and provide the test for private carriage or common carriage in the private land mobile services. Id.

Because CTIA also foresees a highly competitive PCS arena, CTIA supports the Commission's conclusion that PCS should be subject to minimal regulation. Private carrier status for PCS providers could avoid the numerous costs imposed by common carrier regulation, including the problem of dual regulation imposed by federal and state governments. However, because cellular companies are presently treated as common carriers, the Commission must re-examine the disparate regulatory treatment of these two similar and potentially competitive service providers. If PCS is to be treated as private carriage, cellular too should be treated as private carriage.

A. Equal Treatment of PCS and Cellular

CTIA begins with the premise that like services must be regulated alike. Should the Commission choose to test the

limits of its legal authority to hold PCS to only minimal federal and state regulatory oversight, there would be significant implications for cellular's regulatory scheme. If PCS evolves to be substitutable for cellular services, then the regulatory schemes for both cellular and PCS must be comparable as a matter of law, policy, and equity. Absent such comparability, government regulation will have injected a contrivance into marketplace forces such that market efficiencies will be disrupted and market outcomes skewed. If cellular and PCS are close substitutes, then the basis for imposing common carriage, i.e. the need to regulate monopoly control over essential services will be entirely lacking.[57] A realignment of cellular's regulatory status with that of PCS would not only be good policy, it would be a legal imperative by operation of statute and the Equal Protection Clause of the Fifth Amendment. With these imperatives in mind, CTIA below discusses the case for treating PCS (or cellular) as private carriage.

B. Private Carrier Status

The Commission has broad authority under Section 332 to classify PCS services as private carriage. In construing this section, the courts have noted that:

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57 CTIA is already on record demonstrating that the competitiveness of the cellular industry is today sufficient to warrant only minimal regulatory interference. Many states agree, but the few which do not impose real costs on cellular consumers.

> [i]n enacting section 332(c)(1), Congress directed the Commission to deregulate the market and 'add, modify, or delete private land mobile services as the need arises, consistent with the guidelines specified in subsection 33[2](a)'....Section 332(c)(1) was thus not intended to limit the private carrier systems to existing configurations. That section allows the FCC, when faced with future technological and public policy advances, to create new systems that will make more efficient use of the spectrum.

Telocator, supra 761 F.2d at 768 (citing H.R. Conf. Rep. No. 765 at 52-54). As a new technology, PCS may be classified under § 332 as private carriage.

The Notice determines that under the current interpretation of §§ 3(gg) and 332(c) of the Act, "the test for private land mobile service is that a licensee not resell interconnected telephone service for profit." Notice at 5712, citing Fleet Call, 6 F.C.C Rcd 1533, 1537 (1991). It specifically requests comment "on whether prospective providers of PCS intend to or should be allowed to resell interconnected telephone service for a profit." Id.

However, as noted in previous Commission decisions, this statutory resale test is itself subject to the following threshold:

> whether the private system is licensed to multiple licensees or shared by authorized users and, if so, whether the system is interconnected with the public switched telephone network. Only if both of these conditions are met will a further assessment be made of whether the entity providing the interconnection is reselling for profit telephone exchange . . . service or facilities.

American Teltronix, 5 F.C.C Rcd 1955, 1956 (1990) (emphasis added). See Telocator, supra. In Telocator the court noted that a "'private land station is multiple licensed or shared by authorized users if more than one licensee or user has the capability of controlling the land station.'" 761 F.2d at 766 (citation omitted). In situations involving paging services, for example, the Commission, upheld by the D.C. Circuit, has found that this initial threshold of multiple licensing or sharing was not met; thus the resale test need not be applied at all. See e.g., American Teltronix, supra; Telocator, supra; Millicom Corp. Digital Communications, 65 R.R. 2d 235 (1983).

Based on the Notice's tentative analysis, PCS operation would not appear to involve the multiple licensing nor the sort of sharing contemplated by Section 332(c). If the Commission's analysis is correct, then the resale restriction would not apply at all, leaving PCS providers free to resell and still be classified as private carriers under the Act.

PCS may also encompass fixed services, triggering issues over the Commission's general powers to classify new technologies outside of Section 332. The Commission's authority here to classify new technologies as private carriage is less certain. Compare, Nat'l Ass'n of Regulatory Util. Comm'rs v. F.C.C., 525 F.2d 630, 644-646 (D.C. Cir. 1976) (NARUC I) (upholding SMRS as private carriage but applying a holding-out test of common carriage) with Philadelphia Television Broadcasting Co. v. F.C.C., 359 F.2d 282, 284 (D.C.

Cir. 1966) (FCC may refrain from imposing common carrier scheme upon new cable television services); Wold Communications v. F.C.C., 735 F.2d 1465, 1468-1469 (D.C. Cir. 1984) (allowing transponder sales on a private carrier basis within agency discretion; when confronted with "an arcane, fast-moving field of technology...a reviewing court owes particular deference to the expert administrative agency's policy judgments and predictions, its forecasts of 'the direction in which future public interest lies'") (citing WNCN, supra).

As a matter of policy, there is certainly no reason to believe that common carrier regulation of PCS would be appropriate. As the Commission has previously recognized, common carrier regulation has been traditionally imposed, at common law and by modern statute, where an entity holds monopoly control over an essential service. See generally Competitive Carrier Rulemaking, 84 F.C.C. 2d 445 (1981), Appendix B. Moreover, the Commission has continuously recognized the exceptional costs, both intended and unintended, that traditional public utility regulation imposes. See, e.g., Policy and Rules Concerning Rates for Dominant Carriers, 4 F.C.C. Rcd 2873 (1989). There should be a compelling, demonstrable benefit before the agency chooses to so shroud a nascent service; no such demonstration can be made here.

C. State Preemption

The Notice notes that if PCS is regulated as a private land mobile service, then under Section 332(c)(2), "PCS

licensees would not be considered common carriers for any purpose under the Communications Act." Notice at 5713. As a result, "state and local entry and rate regulation of PCS as a private land mobile service would be prohibited by statute." Id. Clearly, under Section 332(c) once a service has been properly classified as private carriage, state preemption of intrastate entry and rate regulation is automatic. However, Section 332's preemption authority is limited to mobile services. Thus the Commission must look more generally to Title I, and especially the reservation of Section 2(b) to find the basis to preempt state regulation of PCS fixed services.

Section 2(b) reserves to the states entry, rate, and other regulatory authority "for or in connection with intrastate communications service by wire or radio of any carrier." 47 U.S.C. § 152(b). The term "carrier" is synonymous with "common carrier" under the Act, and thus a classification as private carriage would appear to nullify the operation of Section 2(b). See Section 3(b); NARUC I, supra, 630 F.2d at 647. The proposition is, however, far from settled. Compare California v. FCC, 905 F.2d 1217 (9th Cir. 1990) (suggesting that 2(b)'s reservation may be operable in the case of any service provided by a common carrier if there is sufficient nexus to telephone service) with F.C.C. v. Midwest Video Corp. 440 U.S. 689 n.9 (1979) (an entity can be a common carrier for some purposes but not for others).

CONCLUSION

In sum, CTIA strongly believes that the Commission should adopt a regulatory structure for PCS which will allow the marketplace to function relatively free of government intrusion. In furtherance of the Commission's goals it should:

- define PCS broadly so as to permit maximum and efficient utilization of PCS-assigned spectrum;
- permit open entry into the PCS marketplace and declare all interested firms eligible to be PCS licensees;
- allocate 100 MHz of spectrum to be divided among five assignments;
- define the geographic scope of PCS license areas to parallel the cellular MSA/RSA licensing scheme;
- permit the free transferability of whole or partial PCS interests; and
- use auctions or, if Congress does not adopt enabling legislation, lotteries for the assignment of PCS licenses.

Technology alone will not ensure the full benefits of a competitive PCS marketplace. Digital technology will greatly increase spectrum capacity and facilitate the introduction of new wireless services, but the incompatibility between digital systems will require cellular carriers to maintain the current AMPs standard to satisfy the public's legitimate requirements for a truly common air interface. The principles set forth above will best serve the public interest by allowing cellular

carriers access to the additional spectrum they need to introduce new wireless services, while providing ubiquitous roaming service and emergency services in times of natural disaster to the ten million cellular customers of today, and millions more in the future.

Respectfully submitted

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ATTACHMENT A

AN ECONOMIC ANALYSIS OF ENTRY BY CELLULAR OPERATORS INTO PERSONAL COMMUNICATION SERVICES

Prepared for:

THE CELLULAR TELECOMMUNICATIONS INDUSTRY ASSOCIATION

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Introduction and Conclusions

On August 14, 1992, the Federal Communications Commission released its Notice of Proposed Rule Making and Tentative Decision in the Matter of the Amendment of the Commission's Rules to Establish New Personal Communications Services.[1] The Notice solicits comments on a broad range of issues concerning the allocation of radio spectrum for Personal Communications Services (PCS), including the amount of spectrum to be allocated, the number of licenses to be issued, the manner of initial licensing, and the regulatory structure the FCC should establish for PCS.

One set of issues on which the Commission seeks comments is eligibility requirements for PCS licenses. Among these issues is whether incumbent cellular licensees should be permitted to acquire PCS licenses in their service areas. In the Notice, the Commission observes that permitting cellular operators to acquire PCS licenses within their service areas could facilitate anticompetitive behavior by reducing the number of independent suppliers of competing cellular and PCS services.[2]

While raising this competitive concern, the Commission also

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[1]Notice of Proposed Rule Making and Tentative Decision, In the Matter of Amendment of the Commission's Rules to Establish New Personal Communications Services, GEN Docket No. 90-314, ET Docket No. 92-100, released August 14, 1992 (hereafter Notice).

[2]Notice, para. 62 and para. 64. Competitive concerns would not be raised, however, were a cellular service provider to acquire a PCS license outside its service area. (Notice, para. 62) Whether or not it allows cellular licensees to acquire additional spectrum inside their service areas, however, the Commission would permit them to use part of their existing spectrum to provide PCS-type services. (Notice, para. 70)

points out that production efficiencies may be attained if cellular licensees were also permitted to supply personal communications services. If there are economies of scope in supplying PCS and cellular services, for example, a single firm supplying both would achieve lower average costs for each service than would two firms each supplying one of the services.[3] In its 1981 Report and Order establishing commercial cellular service,[4] the Commission took efficiencies in production into account, and has indicated a willingness to do so again in the case of PCS.

This paper is a response to the FCC's request for comments on whether cellular providers should be allowed to obtain additional spectrum for PCS within their cellular service areas. Our comments are directed to an analysis of two issues: (1) whether and in what circumstances competitive problems would arise were cellular providers to acquire additional PCS spectrum within their cellular service areas; and (2) whether and in what circumstances there would be offsetting efficiencies from permitting incumbent cellular providers to offer service using the spectrum the Commission proposes to allocate to PCS.

Because PCS is not a well-defined term, and because it is difficult to forecast the ways in which PCS might develop, it is

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[3]Notice, para. 27.

[4]Report and Order in the Matter of an Inquiry into the Use of the Bands 825-845 MHz and 870-890 MHz for Cellular Communications Systems; and Amendments of Parts 2 and 22 of the Commission's Rules Relative to Cellular Communications Systems, CC Docket No. 79-318, adopted April 9, 1981; 86 FCC 2d 469 (1981); hereafter 1981 Report and Order.

not easy to answer these questions. In this paper, we consider a number of possible forms that PCS might take in order to analyze the competitive and efficiency issues raised by the Commission. Each of the alternatives that we examine is designed to illustrate a form of PCS that has particular implications for the policy that should be pursued. At the same time, we recognize that no one can be certain which, if any, of these forms may evolve. As a result, we believe that the FCC should adopt a policy that is adaptable to future developments rather than one that is based on a single view of the future of PCS. In this regard, we are able to reach two broad conclusions about whether to permit incumbent cellular operators to acquire licenses to offer services in the band the Commission proposes to allocate to PCS.

First, although there may be grounds for concerns about the competitive impact of allowing incumbent cellular operators to offer PCS, we conclude that it is easy to overstate these concerns. The impact of such acquisitions depends on the amount of spectrum allocated to PCS, on the number of new licenses that are issued, on the amount of spectrum that cellular operators are permitted to acquire, and on the precise form that PCS takes. Under quite plausible circumstances, permitting incumbent cellular operators to acquire some portion of the PCS spectrum does not raise competitive concerns.

Second, we find that, depending on the form PCS takes, significant production efficiencies may result from permitting incumbent cellular operators to acquire a portion of the PCS

spectrum. These efficiencies can arise through economies of scale, where new services require more spectrum than incumbent operators can make available from their current allocations, and economies of scope, where PCS services can be provided at lower cost by cellular operators than by new firms offering only PCS service.

We find that no competitives problem would arise from cellular providers acquiring a limited amount of spectrum even if PCS were a perfect substitute for traditional cellular service. Moreover, if PCS were not a close substitute, or if there are economies of scale in providing PCS or economies of scope between cellular and PCS, consumers would benefit further if cellular operators were permitted to acquire even more spectrum in order to supply PCS.

A blanket prohibition against the acquisition by cellular operators of the spectrum allocated to PCS would be ill-advised. Such acquisitions pose only limited potential for anticompetitive effects under certain circumstances, and potentially significant efficiencies in others. Since the Commission would not bar cellular operators from acquiring PCS spectrum if it were certain that these circumstances would obtain, and since there exists a presumption in favor of permitting open entry, the Commission should be willing to permit cellular operators to acquire some PCS spectrum in the face of the considerable uncertainties that exist about the future of PCS.

The Initial Cellular Licensing Decision

In its 1981 Report and Order authorizing cellular communications systems on a commercial basis, the Federal Communications Commission concluded that licensing two cellular carriers in each service area would best serve the public interest, convenience, and necessity. In establishing a duopoly structure for the supply of cellular services, the FCC sought to balance the benefits arising from economies of scale with those resulting from competition.

Only seven years before, the technical complexity and expense of cellular systems, together with the large amount of spectrum required for their economic viability, had persuaded the FCC that only one cellular system should be licensed in each service area.[5] Because of significant changes in both regulatory policies and cellular technology in the ensuing years, however, the Commission reconsidered its earlier determination to license only a single cellular operator.

By 1981, the FCC believed that most of the economies of scale in the supply of cellular service could be achieved at a level of output that would accommodate two efficient cellular operators in each service area. In the Commission's view, two cellular licensees in each area "while not providing the most competitive market structure, would provide some competitive advantages, including the fostering of different technological approaches,

[5]Second Report and Order in Docket No. 18262, 46 FCC 2nd 752 (1974).

diversity of service options and some degree of price competition which otherwise would not be present."[6]

The Performance of the Cellular Industry

From its beginning, the cellular telephone communications business has been characterized by rapidly increasing volume, declining prices, expanded service offerings, and significant technological change. The number of cellular telephone subscribers, only 91,600 in January 1985, had grown to an estimated 8.8 million by June 1992.[7] Cellular subscribers are projected to number 19 million by 1995 and 38 million by 2001.[8]

Contributing to this growth has been a steady decline in the costs of owning and using cellular telephones. For example, when adjusted for inflation, the unweighted average of the lowest published rate for access and 250 minutes of prime time use in the 10 largest cellular service areas in 1991 was only 62 percent of its 1983 level.[9] Mobile cellular telephone prices have declined even more, while function and feature improvements have enhanced their quality. When adjusted for inflation, the total 1991 cost of owning and using a cellular telephone was only 44 percent of the

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[6]1981 Report and Order at 474.

[7]Cellular Telecommunications Industry Association, Industry Data Survey, June 30, 1992, p. 1.

[8]Linden Corporation, Cellular Network Technology, End User Requirements, and Competition to the Year 2001, p. 244.

[9]Data are from Herschel Shosteck Associates, Ltd., Cellular Market Forecasts, Data Flash, September 1992.

1983 cost.[10]

Cellular subscribers also have benefitted from a continually expanding variety of services. Today, cellular providers offer a number of value-added services, including information services and features such as voice mail, call forwarding, and call waiting. There have been major advances in data transmission as well, including portable facsimile and wireless transmission for laptop computers. New services continue to be developed.

Recent technological advances have enabled cellular systems to expand their capacity. Several of these innovations have occurred in the conventional or analog cellular technology.[11] The conversion to digital technology, despite the substantial investment required, promises to yield even greater increases in system capacity and lower average costs for cellular operators.[12]

Competition in the Supply of Cellular Services

The cellular service industry's performance is the kind that economists associate with a young industry driven by market forces

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[10]Data are from Shosteck, op. cit, and measure the "drive away" price of a single mobile telephone, including antenna, installation, and first-year maintenance.

[11]H. Shosteck, "The question marks over PCNs," Mobile Europe, January 1991, no pagination.

[12]Coopers & Lybrand, Technological Change and the Cellular Telecommunications Industry (November 1991), pp. 59-60. During a transition period, cellular phones will be dual mode, adaptable to both digital and analog systems.

and developing in a competitive context.[13] This has occurred without a competitive structure, as defined by economists. Economists have recognized, however, that the behavior of firms and an industry's performance can approximate the competitive outcome even if the industry does not consist of a large number of firms, each with a small share of the market.[14]

Collusive arrangements, whether explicit or tacit, are more likely in markets with few firms, simply because the necessary coordination, monitoring, and enforcement functions are easier.[15] However, the competitive outcome may be obtained even in industries with as few as two firms.[16]

Whether firms cooperate and at what price depends on the expected gains from undercutting a noncompetitive price and the expected cost of being punished if such deviation is detected.

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[13]While this record of performance is consistent with a competitive industry, it does not prove that the industry is necessarily competitive, since even a monopolist facing conditions of increasing demand and reduced costs is likely to earn greater profits by lowering price, expanding output, and making innovations in products and production methods.

[14]Economists call a market structure competitive when entry is easy, firms are numerous, and no firm has a large market share. As we point out in the text, the performance of a market can be competitive even if its structure is not.

[15]J.S. Bain, "Relation of Profit Rate to Industry Concentration: American Manufacturing, 1936-1940," Quarterly Journal of Economics 65 (1951), pp. 205-206.

[16]The best-known model that demonstrates this result is from J. Bertrand, "Theorie Mathematique de la Richesse Sociale," Journal des Savants (1883), pp. 499-508. A large body of economic literature predicting a range of competitive outcomes is reviewed in J. Tirole, The Theory of Industrial Organization (Cambridge, MA: The MIT Press, 1988), pp. 225-238.

Economists have identified a number of factors that make collusive practices more or less difficult to establish and that affect the ease with which deviations from a collusive outcome can be detected and punished.[17] Several of these factors are likely to influence cellular service industry performance, albeit to varying degrees.

Competing cellular providers typically offer an array of service packages, none of which may be directly comparable.[18] The lack of an obvious basis for comparing service prices increases the cost of monitoring and punishing deviations from any collusive agreement. As cellular providers take advantage of new technologies to offer new services, the opportunities for "cheating" on a noncompetitive agreement without provoking "punishment" increase still further. This occurs because it is difficult for a rival to determine what the appropriate price of the new service should be.

The tremendous cellular service growth opportunities give managers weaker incentives to coordinate their behavior to preserve industry profits than would a shrinking market. This is because the benefit of undercutting a noncompetitive price is greater when demand is relatively high.[19]

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[17]G.J. Stigler, "A Theory of Oligopoly," Journal of Political Economy 72 (1964), pp. 44-61.

[18]Airtime quality will vary occasionally, as well, if cellular providers fail to anticipate subscription growth, leading to increased traffic congestion.

[19]J.J. Rotemberg and G. Saloner, "A Supergrame-Theoretic Model of Price Wars During Booms," American Economic Review 76 (1986), pp. 390-407.

By keeping its prices low, a firm can increase production and achieve cost savings more rapidly as it moves down its learning curve.[20] The opportunity to achieve significant learning economies may lead cellular firms to price aggressively.[21]

The nonwireline carriers had an especially strong incentive to initiate price reductions upon entering the market. The lower revenue from the nonwirelines' small customer bases would be more than offset by revenues from new customers attracted by price cuts.[22] Historic behavior may influence subsequent competition.

Although entry has not been a source of competitive pressure for cellular providers in the past, the advent of PCS, together with the introduction of a number of new service providers, may bring additional competitive discipline. The introduction of Enhanced Special Mobile Radio (ESMR) will have a similar effect.

Frequent customer transactions and low switching costs diminish the gains from deviating from a collusive agreement and provide ample opportunity for retaliation against suppliers that do so.[23] Nonetheless, the initial subscription incentives and the

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[20]A.M. Spence, "The Learning Curve and Competition," The Bell Journal of Economics 12 (1981), pp. 49-70

[21]Ibid., p. 49.

[22]The Department of Justice and Federal Trade Commission Merger Guidelines of April 2, 1992 (p. 40) state that incentives to cheat on collusive agreements are greater the larger the proportional increase in sales from cheating and the smaller the base of sales prior to cheating.

[23]The activation fee typically is waived when a subscriber switches to the other provider. The phone must be brought in for reprogramming, however.

commissions paid to agents signify that an ongoing relationship is expected with most customers.[24] To the extent subscribers represent a long-term stream of future monthly revenues, cellular service providers have an incentive to compete aggressively for new customers.

Economists recognize that an assessment of market competition must look beyond the number and size distribution of firms to factors that impede or foster collusive behavior. Clearly, there are cellular industry characteristics that discourage collusion and factors that facilitate its practice. The complex interaction of these characteristics makes predicting the competitive outcome difficult. However, the cellular industry's performance, most notably the rapid subscriber growth and the steady decline of prices, is consistent with competitive behavior.

What is PCS?

As discussed above, PCS is not a well-defined term. Indeed, at least four different views have appeared in discussions of PCS. Some providers of cellular service have described PCS as the third phase in the evolution of cellular technology, following service to automobiles and portable telephones. A second view is that PCS comprises several kinds of communications services, based on digital technologies, that will become competitive alternatives to

[24]According to Thomas E. Wheeler, President of the CTIA, on average, 15 percent of a cellular carrier's subscribers switch to the other provider during the course of a year. See "The Wireless Century," Speech, October 21, 1992, p. 4.

cellular telephone services -- for example, CT-2 (second-generation cordless telephones) or ESMR. A third view is that PCS is simply a synonym for wireless or mobile telecommunications services, one of which is cellular radio. Finally, one commentator has suggested that PCS is "more spectrum for something else," namely any and every new wireless concept that is proposed.[25]

A common feature of these views of PCS is that the subscriber can call or be called at any time wherever he or she happens to be. Telocator's PCS Section has defined personal communications service as "a broad range of individualized telecommunications services that enable people or devices to communicate independent of location."[26] PCS is expected to provide individuals with the ability to communicate independent of their location, access method (e.g., network or terminal device), and information format (e.g., voice, data, or graphics). Despite the similarities in concept among these alternative views, however, there are significant differences in application that make it difficult to analyze future competition in the supply of PCS.

The Commission has clearly recognized the difficulties in identifying the future of PCS when it defines the services broadly as "a family of mobile or portable radio communications services which could provide services to individuals and business, and be

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[25]G. Calhoun, Wireless Access and the Local Telephone Network (Boston: Artech House, 1992), p. 573.

[26]Telocator PCS Section, Marketing and Consumer Affairs Committee, Service Description Subcommittee, PCS Service Descriptions, July 22, 1992, p. 1.

integrated with a variety of competing networks"[27] and indicates that it intends for the term PCS "to encompass a family of services that would include services other than voice, such as data, imaging, and other new services."[28]

The difficulty in defining PCS is further revealed by examining the wide range of attributes that a single service may possess. Telocator has identified the following service attributes in its attempt to define PCS[29]:

A. Environment
    1. Residence - Inbuilding
    2. Residence - Neighborhood
    3. Business - Inbuilding
    4. Business - Campus
    5. Public - Pedestrian
    6. Public - Mobile

B. Call Termination

C. Call Origination
    1. Residence/Business
    2. Public

D. Mobility
    1. Residence/Business
    2. Public

E. Data

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[27]Notice, para. 29.

[28]Notice, para. 12.

[29]Telocator, op. cit.

F. Registration

1. Home

2. Roam

G. Privacy

1. Eavesdropping

2. Security

H. Grade of Service

I. Voice Quality

J. Integrated Enhanced Services

Clearly, with these many attributes, and with each attribute having many possible dimensions, the range of possibilities for PCS is very large indeed. Telocator lists 18 "Existing PCSs" and 5 "Emerging PCSs." Yet even this understates the number of such services, since many variations of each of these service exist.

Predicting How PCS Will Affect Competition

Because PCS is not a well-defined term, and because technologies are changing rapidly[30], one cannot predict with any certainty which services will be offered under that rubric. As a result, it is difficult to analyze how alternative spectrum allocations will affect competition among the various Personal Communications Services that may emerge. PCS is not yet commercially available, and there is still considerable uncertainty about the precise features and functions, as well as the costs of

[30]The FCC has authorized over 150 PCS experimental licenses in the past three years. Paragraphs 18 to 21 of the Notice provide an overview of these experiments.

production and prices, of the various services that may be introduced. It is these attributes of PCS that will determine the nature of their relationships with cellular service, that is, whether cellular and a particular PCS are close or poor substitutes, independent goods, or even complements in demand.

Because of the wide variety of Personal Communications Services being developed, and the uncertainty about their salient attributes, it is premature to conclude that PCS will necessarily be a competitive alternative or close substitute for cellular service.[31] Some Personal Communications Services, such as high-speed data service, would seem to be complementary in demand to traditional cellular service. Others, such as low-quality portable services, may be largely independent in demand. And even where PCS is clearly a substitute, it may be an alternative to cellular service only at certain levels of cost, price, and service quality.

The case of CT-2 illustrates the difficulty in assessing the effect of introducing a particular PCS. Since the technology does not permit incoming calls or call handoff, CT-2 will be an attractive alternative to cellular subscribers only if it is priced at a substantial discount from the price of cellular services. From the available information, it is by no means clear that suppliers of CT-2 services could achieve costs that would permit a

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[31]Even if the Commission believed that one of these outcomes was most likely, it should not act as if this outcome were certain. R.D. Luce and H. Raiffa, Games and Decisions (New York: John Wiley, 1957), p. 322, note that "For many policy purposes, point estimation seems to be a dangerous tool, for what in a given instance is the 'best guess' of a parameter may, indeed, be a 'poor guess' in actuality."